

### REMARKS

Applicant appreciates the detailed examination evidenced by the Official Action mailed January 11, 2005 (hereinafter the "Official Action"). In response, Applicant has amended the specification and the claims to further clarify the subject matter of the Application. For example, as described herein below in greater detail, the independent claims have been amended to further clarify that the "floating parasitic element is ohmically isolated from the second planar inverted-F antenna branch and configured to resonate in the first frequency band." *See independent Claims 1 and 15.* Applicant has also amended the specification as suggested by the Examiner and has canceled several of the claims in response to the objections thereto. In view of the above amendments and arguments herein, Applicant respectfully requests further examination and allowance of the pending claims for at least the reasons discussed herein.

#### **The specification has been amended as suggested by the Examiner.**

The specification stands objected to over the inclusion of reference numerals 505 and 535 in Figure 5 of the Application. *See Official Action, page 2.* In response, Applicant has amended the paragraph beginning at page 10, line 22 to include a description that "the second planar inverted-F antenna branch 530 and a first planar inverted-F antenna branch 505 define an open region 535 therebetween." Applicant respectfully submits that support for these recitations can be found, for example, in Figure 5 itself as well as in similar description of the similar structural relationship shown in Figure 3, which includes like reference numerals 305 and 353. Applicant, therefore, respectfully requests the withdrawal of the objections to the specification in view of the amendments herein.

Applicant has also made several amendments to the paragraphs beginning at page 9, line 4 and page 10, line 4 to correct typographical errors therein.

#### **The objections to the Claims have been overcome by amendment.**

Claims 24 and 25 stand objected to over similarities between with Claims 16 and 17. *See Official Action, page 2.* As suggested by the Examiner, Claims 24 and 25 have been

canceled without prejudice or disclaimer. Accordingly, Applicant respectfully submits that the objections to the claims have been obviated by amendment.

**The claims comply with 35 U.S.C. § 112 as written.**

Claims 7, 8, 20, and 21 stand rejected under 35 U.S.C. § 112, second paragraph. *See Official Action, page 2.* In particular, the Official Action has raised questions regarding the recitation of "the second planar inverted-F antenna branch extends in first and second directions and the floating parasitic element extends in the first and second directions." In response, Applicant respectfully directs the Examiner's attention to, for example, the paragraph at page 7, line 3 of the Application, which recites (in reference to Figure 3) "a first planar inverted-F antenna branch 305 that extends substantially in a first direction." In referring to Figure 3, Applicant notes that the first direction can be downward from the proximate portion 320. Furthermore, the paragraph which begins at page 7, line 13 goes on to state that a "second planar inverted-F antenna branch 330 extends substantially in a second direction away from the proximate portion 320... and extends a second distance in the first direction (substantially parallel to the first planar inverted-F antenna branch 305)." Applicant respectfully notes that the second direction can, therefore, be in a horizontal direction away from the proximate portion 320. In view of the above-cited exemplary description in the Application, Applicant respectfully submits that the recitations of Claims 7 and 20 comply with 35 U.S.C. § 112.

The Official Action also rejected Claims 8 and 21 based on the recitation of a "first frequency band and a first frequency range." *See Official Action, page 3.* In response, Applicant respectfully directs the Examiner's attention to the paragraph that begins at page 10, line 4 of the Application (as amended), which refers to Figure 4. In particular, the Application states that the "floating parasitic element 340 can provide a first component of a signal, for example, in a lower range of frequencies in the first frequency band." Applicant therefore respectfully submits that the term "frequency band" refers to operational frequencies, such as 1710 MHz to about 1990 MHz and/or 824 MHz to about 960 MHz. *See for example, page 7, lines 10-13 and lines 20-22.* In contrast, the "frequency ranges" include frequencies found within the frequency bands. For example, in referring to Figure 4, the

floating parasitic element 340 resonates to provide a first component of a signal in the lower range of frequencies in the first frequency band whereas the second component of the signal is provided at an upper range of frequencies in the first frequency band. In other words, the floating parasitic element can provide a first signal component in a first range of frequencies within the frequency band whereas the first branch can provide a second signal component in a second range of frequencies within the same frequency band. Accordingly, Applicant respectfully submits that Claims 8 and 20 also comply with 35 U.S.C. § 112. Applicant respectfully requests the withdrawal of the rejections of Claims 7, 8, 20, and 21, for at least the reasons discussed above.

**Amended independent Claims 1 and 15 are patentable over Sadler.**

Claims 1-26 stand rejected under 35 U.S.C. § 102 over U.S. Patent Application Publication No. 2004/0198293 to Sadler et al. ("Sadler") *Official Action, page 3*. In response, Applicant has amended independent Claims 1 and 15 to further clarify the patentable subject matter recited therein. For example, independent Claim 1 has been amended to recite in-part:

a first planar inverted-F antenna branch configured to resonate in response to first electromagnetic radiation in a first frequency band;  
a second planar inverted-F antenna branch configured to resonate in response to second electromagnetic radiation in a second frequency band that is less than the first frequency band; and  
a floating parasitic element ohmically isolated from the second planar inverted-F antenna branch and **configured to resonate in the first frequency band.**

Amended independent Claim 15 includes similar recitations.

Applicant respectfully submits that Sadler does not disclose, for example, "a floating parasitic element... configured to resonate in the first frequency band." Anticipation under § 102 requires that each and every element of the claim is found in a single prior art reference. *W. L. Gore & Associates Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1983). Stated another way, all material elements of a claim must be found in one prior art source. *In re Marshall*, 198 U.S.P.Q. 344 (C.C.P.A 1978). "Anticipation under 35 U.S.C. § 102 requires the disclosure in a single piece of prior art of each and every limitation

of a claimed invention." *Apple Computer Inc. v. Articulate Systems Inc.* 57 USPQ2d 1057, 1061 (Fed. Cir. 2000). A finding of anticipation further requires that there must be no difference between the claimed invention and the disclosure of the cited reference as viewed by one of ordinary skill in the art. See *Scripps Clinic & Research Foundation v. Genentech Inc.*, 927 F.2d 1565, 1576, 18 U.S.P.Q.2d 1001, 1010 (Fed. Cir. 1991). Additionally, the cited prior art reference must be enabling, thereby placing the allegedly disclosed matter in the possession of the public. *In re Brown*, 329 F.2d 1006, 1011, 141 U.S.P.Q. 245, 249 (C.C.P.A. 1964). Thus, the prior art reference must adequately describe the claimed invention so that a person of ordinary skill in the art could make and use the invention.

As understood by Applicant, Sadler discusses first and second radiating branches coupled to one another (in one example therein) by a parasitic element to change the resonance of the first and/or the second radiating branch. For example, Sadler states:

Turning to FIG. 2, FIG. 2A illustrates one view of an inverted-F antenna according to some embodiments of the present invention. The ground plane is omitted for clarity. Antenna 200 includes an area, 202, where a signal feed conductor and a ground feed conductor are attached. Signal feed conductor 204 is visible. **A first radiating branch is comprised of multiple segments. Segment 206 connects the first radiating branch to the signal feed conductor and ground feed conductor.** The first radiating branch also includes segment 208 and segment 210. This first radiating branch tends to create one base resonance at a fundamental frequency, roughly in the 900 MHz range, useful for certain GSM systems. In this particular embodiment, the antenna has a second base resonance frequency at approximately 1,900 MHz. The bandwidth of the antenna in this area is great enough to accommodate both the 1,900 MHz GSM band and the 1,800 MHz GSM band.

In the embodiment of FIG. 2, the antenna includes a second radiating branch 212 which has a first end, 214, which is connected to the signal feed conductor and ground feed conductor approximately in area 202 where the first radiating branch is connected. **Second radiating branch 212, however, includes a second end 216, which capacitively couples the second radiating branch to the first radiating branch. The capacitive coupling can be adjusted to create an additional resonance.** In this particular example, the additional resonance is for the global positioning system (GPS) as the terminal into which this antenna is to be built, will include a GPS receiver. GPS operates at approximately 1,575 MHz. GPS is well-known to those skilled in the art. GPS is a space-based

triangulation system using satellites and computers to measure positions anywhere on the earth. Compared to other land-based systems, GPS is less limited in its coverage, typically provides continuous twenty-four hour coverage regardless of weather conditions, and is highly accurate. In the current implementation, a constellation of twenty-four satellites orbiting the earth continually emit the GPS radio frequency. The additional resonance of the antenna as described above permits the antenna to be used to receive these GPS signals. *Sadler, page 2, paragraphs 16-17 (Emphasis added).*

Furthermore, Sadler goes on to discuss the specific example including a parasitic element as follows:

FIG. 4 is a single view of another embodiment of an antenna, 400, according to the invention. The antenna of FIG. 4 is identical in many structural respects to the antenna of FIG. 2, therefore, most of the structural aspects have not been highlighted by reference numbers or described. However, there are two readily visible differences between the antenna of FIG. 2 and the antenna of FIG. 4. **Firstly, capacitive coupling between the first radiating branch and the second radiating branch is now achieved by a separate parasitic conductor**, 402, which may be installed with adhesive or otherwise structurally supported by the housing of the radiotelephone terminal. Again, this parasitic could be either over or under the radiating branches as shown in this view, and in either case it may be referred to as "over" or "overlapping". The parasitic does not have to be rectangular, but could vary in shape as well as size. Essentially all of the parasitic area, with the exception of the portion that falls directly over the small space between the two radiating branches is capacitively coupled with one or the other of the two branches, as the case may be. **Again, the area of capacitive coupling and the distance between the parasitic and the branches can be adjusted to tune the additional resonance, based on the formula previously discussed**, except that a designer is essentially dealing with two capacitors in series. In this particular design, an extra extension, 404, had to be added to the first radiating branch to achieve appropriate resonances. This extension may or may not be necessary in any particular case, depending on the overall shape and bends of the inverted-F antenna and the particular application. It is easily within the capabilities of one of ordinary skill in the art to experimentally tune such an antenna for a particular application in question. *Sadler, page 3, paragraph 22 (Emphasis added).*

As demonstrated by the above-cited passages of Sadler, as understood by Applicant, the examples discussed therein use capacitive coupling (via the second end 216 in the case of

Figure 2 and the parasitic element 402 in Figure 4) to modify the resonance of the first and/or second radiating branches. In contrast, as discussed in the present Application, the floating parasitic element is...configured to **resonate** in the first frequency band. *Amended independent Claims 1 and 15.* In other words, as understood by Applicant, Sadler discusses using a parasitic element to **couple** the first and second radiating branches (*i.e.*, a coupler), which does not disclose a floating parasitic element that is itself a **resonator**.

Accordingly, Applicant respectfully submits that amended independent Claims 1 and 15 are patentable over Sadler for at least the reasons discussed above. Furthermore, dependent Claims 2-14 and 16, 18-23 are patentable for at least for the patentability of the amended independent claims.

**Many of the dependent claims are separately patentable**

In addition to the reasons discussed above in reference to amended independent Claims 1 and 15, many of the dependent claims provide separate bases for patentability. For example, dependent claim 2 recites in-part "wherein the floating parasitic element is **coplanar with the second planar inverted-F antenna branch.**" Claim 16 includes similar recitations. As shown in the Figures of Sadler, none of the examples discussed therein discloses a floating parasitic element that is both ohmically isolated from the second planar inverted-F antenna branch and coplanar therewith. For example, Figure 2 of Sadler shows the portion 216 is ohmically coupled to the radiating branch 212, and Figure 4 of Sadler shows that the parasitic element 402 is positioned overlapping or underlapping relative to the opposite radiating branch. Accordingly, as understood by Applicant, Sadler does not disclose a "floating parasitic element that is ohmically isolated and coplanar with a second planar inverted-F antenna branch." Accordingly, Claims 2 and 16 are also patentable for at least these additional reasons.

Dependent Claim 8 recites in-part:

wherein the first planar inverted-F antenna branch is configured to provide a first signal component in a first frequency range of the first frequency band; and

wherein the floating parasitic element is configured to resonate to provide a second signal component in the first frequency band in a second frequency range in the first frequency band that overlaps the first

frequency range to provide a Voltage Standing Wave Ratio for the multi-band antenna assembly in the first frequency band of about 2.5:1.

Dependent Claim 21 includes similar recitations.

As understood by Applicant, Sadler does not disclose that the parasitic element discussed therein resonates (as discussed above in reference to amended independent Claims 1 and 15) to provide a second signal component in a second frequency range in the first frequency band that overlaps the first frequency range. For example, in some embodiments according to the invention as illustrated by Figure 4 of the application, the floating parasitic element can resonate and provide the signal component illustrated by the dotted line in reference to 405, whereas the first planar inverted-F antenna branch can resonate to provide a second component signal also in the first frequency band, but in the second frequency range which overlaps the first frequency range.

As discussed above in reference to the rejections under § 112, Applicant notes that the frequency band as defined herein defines a range of operation to provide communications service in the first frequency band by overlapping the first and second signal components to provide improved VSWR performance in the first frequency band. In other words, the first and second signal components combine to provide better performance in the first frequency band. In contrast, even assuming for the sake of argument that Figure 3 of Sadler did show resonance in first and second frequency ranges, these frequency ranges do not overlap. Moreover, such resonances are provided by the radiating branches themselves and not by the parasitic element in Sadler. Accordingly, Claims 8 and 21 are also patentable over Sadler for at least these additional reasons.

**The new claims are also patentable over Sadler.**

Applicant has added herein new claims 27 and 28 which are also patentable over Sadler. In particular, new Claim 27 recites in part:

- a first planar inverted-F antenna branch configured to resonate in response to first electromagnetic radiation in a first frequency band;
- a second planar inverted-F antenna branch configured to resonate in response to second electromagnetic radiation in a second frequency band that is less than the first frequency band; and

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a floating parasitic element ohmically isolated from and coplanar with the second planar inverted-F antenna branch and configured to electromagnetically couple to the second planar inverted-F antenna branch.

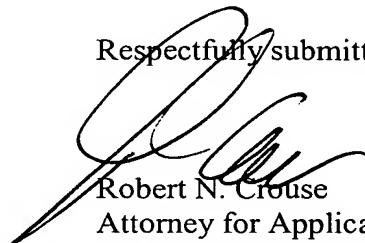
Therefore, Claim 27 recites a "floating parasitic element ohmically isolated from and coplanar with the second planar inverted-F antenna branch." As discussed above in reference to dependent Claims 2 and 16, Sadler does not disclose these recitations. Accordingly, new Claim 27 is patentable over Sadler for at least these reasons.

Applicant has also added new dependent Claim 28 which recites in-part "wherein the floating parasitic element is shaped to substantially follow an outer contour of the second planar inverted-F antenna branch." Applicant respectfully submits that Sadler does not disclose the detailed recitations included in new dependent Claim 28. Accordingly, new dependent Claim 28 is also patentable over Sadler for at least these reasons.

### CONCLUSION

Applicant has amended independent Claims 1 and 15 to further clarify the patentable subject matter recited therein. Applicant has also provided evidence that many of the dependent claims are patentable over Sadler. Accordingly, Applicant respectfully requests the withdrawal of all rejections and the allowance of all claims in due course. If any informal matters arise, the Examiner is encouraged to contact the undersigned by telephone at (919) 854-1400.

Respectfully submitted,



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